Advanced Military Informatics Focus Group

Sampling of Current Federal Solicitations

BAA 07-21
Agency: DARPA-DSO

Type: Presolicitation Notice

Due Date: This BAA will be through **29 February 2008.**

Website: http://www.darpa.mil/baa/baa07-21.html

The mission of the Defense Advanced Research Projects Agency's (DARPA) Defense Sciences Office (DSO) is to identify and pursue high-risk/high- payoff research initiatives throughout a broad spectrum of the science and engineering disciplines, and to transform these initiatives into important, radically new military capabilities. To carry out this mission, DSO seeks research ideas and areas that might lead to innovations in science and engineering. Therefore, DSO is soliciting proposals for advanced research and development in a variety of enabling technical areas as described below.

Advanced Mathematics: Application and development of advanced mathematics for applications of interest to the Department of Defense (DoD):

Specific areas of interest include, but are not limited to:

- Dimensionality reduction, error propagation, and uncertainty management in databases, models, and experiments;
- Modeling of materials, physics, and biology;
- Tools to predict the performance of complex systems across a variety of application domains (e.g., physics, biology, and sociology);
- Adaptive sensing, waveform design, and scheduling;
- Methods for the design of experiments that minimize the number of experiments and that maximize information for coupled non-linear systems;
- Representation and analysis of large and/or disparate data sets;
- Computational geometry and topology;
- Electromagnetic modeling and simulation;
- Quantum information sciences;
- Signal and image processing; and
- New applications of traditionally pure mathematics

BAA07-18 Microsystems Technology Office-Wide
Agency: DARPA-MTO

Type: Presolicitation Notice

Due Date: BAA open from 1/15/07-1/14/08

The Microsystems Technology Office's (MTO) mission is to exploit breakthroughs in materials, devices, circuits, and mathematics to develop beyond leading edge Microsystems components with revolutionary performance and functionality to enable new platform capability for the Department of Defense. To execute this mission, MTO supports revolutionary research in electronics, photonics, MEMS, algorithms, and combined Microsystems technology to deliver new capabilities to sense, communicate, energize, actuate, and process data and information for the war fighter.

This announcement seeks revolutionary research ideas for topics not being addressed by ongoing MTO programs or other published BAA solicitations. This BAA is primarily, but not solely, intended for early stage research that will lead to larger, focused, MTO programs in the future. Potential bidders are highly encouraged to review the current MTO programs listed on the MTO website at: http://www.darpa.mil/mto/radprograms.html and other MTO solicitations list at: http://www.darpa.mil/mto/solicitations/index.html to avoid proposing efforts to this BAA that duplicate existing activities or that are responsive to other published MTO BAA's. Contacting MTO program managers to discuss research interests is also encouraged. Specifically excluded is research that primarily results in evolutionary improvements to the existing state of practice.

Research areas of current interest in MTO, include, but are not limited to:
1.Low power, high performance digital and analog data processing
2.Novel electronic and photonic device demonstrations
3.Novel semiconductor materials enabling new device concepts or capabilities
4.Nanophotonics and nanoelectronic device and circuit demonstrations
5.Power Electronics
6.RF technology
7.Biological and chemical sensors
8.Quantum information science and technology
9.Chip scale navigation, timing, and control
10.Three dimensional digital, RF, and imaging technologies
11.Integrated chip-scale photonics
12.Micro-scale power generation, control, and conversion
13.Infrared and ultraviolet detectors and imagers
14.Terahertz technology
15.Optical communication technology
16.Analog-to-digital conversion
17.Co-optimization of hardware and algorithms

18.Novel complex circuit design technology
19.Trusted design and hardware technology
20.Microsystems addressing challenges in complex systems architectures
21.Scaling of macro-systems to micro and nano-scale
22.Micro and NanoElectroMechanical Systems (MEMS and NEMS)

BAA07-12 - Location and Connection Aware Content Pushing (LOCO) Program
Agency: DARPA-STO

Type: Presolicitation Notice

Due Date: Jan 16, 2008

Website: http://www.darpa.mil/baa/baa07-12.html

The vision of the LOCO program is to provide information to commanders before they need it by anticipating their needs. Current systems (e.g., file caches, peer-to-peer networks or Akamai-like systems) watch what users request and react by either moving data or shifting users to other data stores. These techniques neither move the data beforehand nor work efficiently in bandwidth constrained military environments. DARPA requests proposals for two Technical Topic Areas supporting the LOCO program.

The first Topic Area covers the full scope of development (e.g., an end-to-end system designed by a team of multidisciplinary research organizations, plus an integrator for coordination and implementation support).

The second area deals with test and evaluation. Proposers may not bid against both areas. Proposals addressing only individual component-level technologies will be considered non-responsive to this BAA. Proposals submitted against Technical Topic Area 1 (developing an end-to-end system to provide LOCO capabilities) will be evaluated on the merit and relevance of the specific proposal as it relates to the following areas in descending order of importance: technical approach; potential for proposed effort to meet program metrics; ease of transitioning proposed technology into Defense Department networks; potential contribution and relevance to the DARPA Mission; and cost reasonableness and realism.

Proposals submitted against Technical Topic Area 2 (build, maintain, and operate a testbed to evaluate LOCO technologies against LOCO program metrics) will be evaluated on the merit and relevance as it relates to following areas in descending order of importance: ability to build, maintain, and operate a testbed to evaluate LOCO technologies against LOCO program metrics; potential contribution and relevance to the DARPA mission; and cost reasonableness and realism.

BAA07-32 - Intrinsically Assurable Mobile Ad-Hoc Network (IAMANET)
Agency: DARPA-STO

Type: Presolicitation Notice

Due Date: Proposals due by **Apr. 29, 2008**

Website: http://www.darpa.mil/baa/BAA07-32.html

The objective of the IAMANET program is to develop an intrinsically assurable mobile ad-hoc network. An intrinsically assurable mobile ad-hoc network will directly support integrity, availability, reliability, confidentiality, and safety of MANET communications and data. In contrast, the dominant Internet paradigm is intrinsically insecure. For example, the Internet does not deny unauthorized traffic by default and therefore violates the principle of least privilege. In addition, there are no provisions for non-repudiation or accountability and therefore adversaries can probe for vulnerabilities with impunity because the likelihood of attributing bad behavior to an adversary is limited. Finally (although not exhaustively) existing protocols are not robust to byzantine failures and malicious behavior, leaving entire Internet-based systems vulnerable in the case of defensive failure. The broad objectives of the IAMANET program are to address these Internet-paradigm problems and related challenges such as: increasing the probability that bad behavior will be detected; increasing work factor and uncertainty for an adversary; and explicitly identifying a minimal set of critical components that must be deeply evaluated and protected from lifecycle attacks. Specific program metrics will highlight attack containment and the prevention of information exfiltration.

Even though the program is initially focused on MANETs, substantial elements of the proposed solutions will be expected to have application in the wider Global Information Grid (GIG) and will be expected to address many of the design criteria of the original DARPA Internet (if not necessarily in the same priority order). The scope of the envisioned program extends to clean-slate designs. For discussion of the original DARPA Internet design criteria and their relationship to clean-slate approaches, potential proposers are encouraged to study the proceedings of the Assurable Global Networking (AGN) RFI workshop. The AGN proceedings, as well as emerging questions and answers, can be retrieved via the IAMANET web site.

A MANET is a mobile multi-hop wireless communication network, possibly but not necessarily hierarchical in nature, and possibly but not necessarily directional in nature. MANET nodes generally contain both hosts and routers, and are deployed on heterogeneous platforms including manned and unmanned vehicular platforms in the ground and in the air, stationary and mobile sensor systems, and handheld devices. Some but not all MANET nodes are limited by resource constraints including power and processing capacity, which may affect their ability to participate fully or partially in a cooperative defense of the network. MANETs cannot rely on centralized services, are intended to be self-forming, have dynamic topology, cannot assume global visibility, and lack physical security. The wireless medium implies bandwidth limitations, intermittent

connectivity, and message loss. MANETs will be forward-deployed and exposed, and as a result all mobile networking protocols and infrastructure are prone to attack and manipulation. In addition, the wireless communication channel provides easy passive analysis and potential for disruption from adversaries. Nonetheless, whether under attack or not, an assurable MANET will be expected to sustain a wide range of applications and traffic loads to include unicast and multicast traffic patterns, elastic and inelastic traffic, client-server/peer-to-peer/group communications, plus semi-real-time traffic as well as traffic with softer delivery requirements.

BAA 07-37 C-Sniper
Agency: DARPA-STO

Type: Presolicitation Notice

Due Date: NOTE: Although this BAA will be open for one (1) year from the date of its publication **(May 24, 2008)** on www.fbo.gov, the Government anticipates that the majority of initial funding for this program will be committed during First Selections. To be considered for funding during First Selections, full proposals must be received no later than 4:00 PM local Arlington, Virginia time on 9 July 2007.

Website: http://www.darpa.mil/baa/BAA07-37.html

DARPA-STO is soliciting proposals for the detection and neutralization of enemy snipers before they can engage with US Forces. The program will be executed in two Phases leading to delivery of a field testable prototype suitable for operational experimentation as an integrated part of the DARPA Crosshairs system. The Crosshairs system is already under development at Mustang Technologies, Allen, TX. The purpose of the Crosshairs is to detect enemy bullets, RPGs, and mortars fired at our vehicles and to prevent them from striking the vehicle. C-Sniper will augment this capability by identifying threats before they can fire. The C-Sniper will be integrated with DARPA's Crosshairs system in Phase 2 of the program.

The enemy snipers may be operating both with, and without telescopic sights, and other optical systems in high cluttered urban environments. The C-Sniper system will operate day and night from a moving military vehicle and provide the operator with sufficient information to make a timely engagement decision. Once the decision is made, the C-Sniper will provide data and control to point and track the on-board weapon (provided in DARPA's Crosshairs system) on the selected target. The final decision to fire the weapon will be left to the operator as required per the rules of engagement. During operation, the C-Sniper must be eye safe for personnel on the vehicle and near the vehicle.
There are many significant technical challenges to overcome to make this into an operational combat system. These may include as a minimum but not limited to the following:

1) Detect enemy snipers carrying weapons before they fire a shot. Key objective is to determine where the shot may come from rather than where it came from;
2) Develop techniques to reject clutter and maximize probability of correctly detecting and locating the target;
3) Reduce system design complexity minimizing moving parts while maximizing robustness;
4) Integrate C-Sniper with DARPA's Crosshairs on military vehicles.

BAA07-52, Scalable Network Monitoring
Agency: DARPA-STO

Type: Presolicitation Notice

Due Date: BAA07-52 will remain open until 4:00 pm local time, **August 8, 2008.**

Website: http://www.darpa.mil/baa/BAA07-52.html

DARPA seeks innovative proposals in computer network monitoring systems. New approaches to network-based monitoring are sought that provide maximum coverage of the network (i.e. from the gateway down) with performance independent of the network size and computational costs that remain a constant (or decreasing) fraction of the computational power of the total network being defended.

Technical Area One: Scalable Computer Network Monitoring Systems
Solutions proposed for this technical area must be able to provide gateway-and-below (i.e. providing ~100% coverage) network traffic monitoring approaches that scale not above linearly with network size. This is defined as providing performance independent of the traffic rate while computational costs of the system remain a constant (or decreasing) fraction of the computational power of the total network being defended. Desired performance parameters include (1) probability of detection (Pd) of malicious traffic greater than 99% per attack launched and (2) a false alarm rate while monitoring traffic of not more than one false alarm per day. Phase I (Base Effort) will demonstrate this capability at conventional gateway line speeds of 1Gbps, while Phase II (Option 1) will demonstrate the scalability of this capability at gateway line speeds of 100Gbps. Offerors must state in proposals their plan for providing deliverables for installation, training, manuals, etc required for evaluation by the testing facility, as well as travel costs. Responses based on traditional and mature technologies such as signature-based scanners and heuristics-based anomaly detectors are discouraged. Additionally, because some threats are applicable only at the network level and significant investment in host-based approaches is being funded elsewhere, responses centering on host-based approaches are also discouraged.

Technical Area Two: Test and Evaluation
Proposers for this technical area will create a testbed including real-time link speeds at the required rates, services, topology, host and traffic emulation for typical DoD installations, and malicious traffic generation for a variety of attack types (including probes, denial of service, remote to local, privilege escalation, and data attacks) and threat groups (including recreational hackers, organized crime, terrorist organizations, and nation states). Teaming with experienced malicious code traffic providers is encouraged. Phase I (Base Effort) will result in a testbed that represents traffic between a simulated Department of Defense NIPRNet installation and the internet at 1Gbps. Phase II (Option 1) will result in a testbed that operates at 100Gbps. The performer will also collect and analyze raw data to provide the DARPA Program Manager an evaluation of

the technical performers' system against the program metrics described in Technical Area One.

BAA07-38 Multilingual Automatic Document Classification Analysis and Translation (MADCAT)
Agency: DARPA-IPTO

Type: Presolicitation Notice

Due Date: Final closing for submissions is **Apr. 28, 2008.**

Website: http://www.darpa.mil/baa/BAA07-38.html

The goal of this program is to automatically convert foreign language text images into English transcripts, thus eliminating the need for linguists and analysts while automatically providing relevant, distilled actionable information to military command and personnel in a timely fashion. Proposed research should investigate innovative approaches and techniques that lead to or enable revolutionary advances in the state of the art.

BAA07-68 DARPA Mathematical Challenges
Agency: DARPA

Type: Presolicitation Notice

Due Date: White Papers and Full Proposals may be submitted and received at any time until the final BAA deadline of 4:00PM ET, **September 8, 2008.**

Website: http://www.darpa.mil/baa/BAA07-68.html

DARPA seeks innovative proposals addressing these Mathematical Challenges. Proposals should offer high potential for major mathematical breakthroughs associated to one or more of these challenges. Responses to multiple challenges should be addressed individually in separate proposals. Submissions that merely promise incremental improvements over the existing state of the art will be deemed unresponsive.

Mathematical Challenge One: **The Mathematics of the Brain**

- Develop a mathematical theory to build a functional model of the brain that is mathematically consistent and predictive rather than merely biologically inspired.

Mathematical Challenge Two: **The Dynamics of Networks**

- Develop the high-dimensional mathematics needed to accurately model and predict behavior in large-scale distributed networks that evolve over time occurring in communication, biology, and the social sciences.

Mathematical Challenge Three: **Capture and Harness Stochasticity in Nature**

- Address Mumford's call for new mathematics for the 21st century. Develop methods that capture persistence in stochastic environments.

Mathematical Challenge Four: **21st Century Fluids**

- Classical fluid dynamics and the Navier-Stokes Equation were extraordinarily successful in obtaining quantitative understanding of shock waves, turbulence, and solitons, but new methods are needed to tackle complex fluids such as foams, suspensions, gels, and liquid crystals.

Mathematical Challenge Five: **Biological Quantum Field Theory**

- Quantum and statistical methods have had great success modeling virus evolution. Can such techniques be used to model more complex systems such as bacteria? Can these techniques be used to control pathogen evolution?

Mathematical Challenge Six: **Computational Duality**

- Duality in mathematics has been a profound tool for theoretical understanding. Can it be extended to develop principled computational techniques where duality and geometry are the basis for novel algorithms?

Mathematical Challenge Seven: **Occam's Razor in Many Dimensions**

- As data collection increases can we "do more with less" by finding lower bounds for sensing complexity in systems? This is related to questions about entropy maximization algorithms.

Mathematical Challenge Eight: **Beyond Convex Optimization**

- Can linear algebra be replaced by algebraic geometry in a systematic way?

Mathematical Challenge Nine: **What are the Physical Consequences of Perelman's Proof of Thurston's Geometrization Theorem?**

- Can profound theoretical advances in understanding three dimensions be applied to construct and manipulate structures across scales to fabricate novel materials?

Mathematical Challenge Ten: **Algorithmic Origami and Biology**

- Build a stronger mathematical theory for isometric and rigid embedding that can give insight into protein folding.

Mathematical Challenge Eleven: **Optimal Nanostructures**

- Develop new mathematics for constructing optimal globally symmetric structures by following simple local rules via the process of nanoscale self-assembly.

Mathematical Challenge Twelve: **The Mathematics of Quantum Computing, Algorithms, and Entanglement**

- In the last century we learned how quantum phenomena shape our world. In the coming century we need to develop the mathematics required to control the quantum world.

Mathematical Challenge Thirteen: **Creating a Game Theory that Scales**

- What new scalable mathematics is needed to replace the traditional Partial Differential Equations (PDE) approach to differential games?

Mathematical Challenge Fourteen: **An Information Theory for Virus Evolution**

- Can Shannon's theory shed light on this fundamental area of biology?

Mathematical Challenge Fifteen: **The Geometry of Genome Space**

- What notion of distance is needed to incorporate biological utility?

Mathematical Challenge Sixteen: **What are the Symmetries and Action Principles for Biology?**

- Extend our understanding of symmetries and action principles in biology along the lines of classical thermodynamics, to include important biological concepts such as robustness, modularity, evolvability, and variability.

Mathematical Challenge Seventeen: **Geometric Langlands and Quantum Physics**

- How does the Langlands program, which originated in number theory and representation theory, explain the fundamental symmetries of physics? And vice versa?

Mathematical Challenge Eighteen: **Arithmetic Langlands, Topology, and Geometry**

- What is the role of homotopy theory in the classical, geometric, and quantum Langlands programs?

Mathematical Challenge Nineteen: **Settle the Riemann Hypothesis**

- The Holy Grail of number theory.

Mathematical Challenge Twenty: **Computation at Scale**

- How can we develop asymptotics for a world with massively many degrees of freedom?

Mathematical Challenge Twenty-one: **Settle the Hodge Conjecture**

- This conjecture in algebraic geometry is a metaphor for transforming transcendental computations into algebraic ones.

Mathematical Challenge Twenty-two: **Settle the Smooth Poincare Conjecture in Dimension 4**

- What are the implications for space-time and cosmology? And might the answer unlock the secret of "dark energy"?

Mathematical Challenge Twenty-three: **What are the Fundamental Laws of Biology?**

- Dr. Tether's question will remain front and center in the next 100 years. I place this challenge last as finding these laws will undoubtedly require the mathematics developed in answering several of the questions listed above.

BAA0715 ELUSIVE SURFACE TARGET ENGAGEMENT TECHNOLOGY
Agency: DARPA/IXO

Type: Presolicitation Notice

Due Date: This BAA will remain open from 27 March 2007 through 27 March 2008.

Website: http://www.darpa.mil/baa/baa0715.html

A.1 Areas of Interest

As a systems-oriented office, IXO is interested in both system concepts and enabling technologies that radically improve our armed forces' capabilities to find, identify, track and engage surface targets, anywhere on the globe, in all environments, and at all times. IXO's interests focus on the most difficult and extreme military missions, including:

1) military operations in difficult environments, including forested, mountainous, and swampy terrain;
2) urban operations against regular military forces;
3) counter-insurgency operations against irregular forces and their infrastructure; and
4) providing security against maritime threats in open ocean and littoral regions.

A.2 Technologies of Interest

DARPA/IXO is interested in proposals that combine emerging technologies with high-payoff system applications. Proposals that address any combination of technology and application that fall within IXO's broad mission objectives may be submitted under this solicitation.

Advanced Sensors

Approaches to increase sensor coverage and sensitivity to targets of interest in cluttered environments, and under conditions of camouflage, concealment and deception. Applicable sensors include synthetic aperture, real beam and ultra-wideband radars, multistatic radars, laser radar, acoustic/seismic, passive radio-frequency emitters, and cameras in all spectral ranges.

Sensor Processing

Techniques to improve sensor operation in detection and extraction of target data or communicating results to remote exploitation systems, including new forms of image formation and manipulation, target enhancement, sensor control, feature extraction, multisensor fusion, and image compression.

Environmental Context Generation

Algorithms to extract information about the background from received sensor data, including techniques that can estimate terrain characteristics, extract hydrological, botanical, and man-made features, and categorize features into semantic classes.

Target Discrimination

Methods to extract reliable target information from sensor data with a low false-alarm rate, including techniques that can rapidly form target models at very high fidelity. This encompasses target detection, classification, recognition and identification.

Tracking

Technologies to track many targets from noisy and multiple sensor data derived from a cluttered background, with special emphasis on solutions that scale to large numbers of similar targets and sensors with wide fields of view.

Information Fusion

Algorithm and processing approaches that can effectively combine multiple disparate sensor returns and data base elements, particularly methods that are robust to errors, can handle missing/inferred data and use contextual information.

Visualization / Immersive Operations

Techniques to provide actionable combat information to the soldier in dispersed and urban regions, including both situational awareness and expected courses of action, from individual soldiers to theater-level command centers.

Pattern Analysis

Algorithms that can isolate trends and sequences in military datasets and sensor returns ot generate hypotheses or cues about adversarial activities, especially methods that combine spatial, spectral, temporal, and metadata relationships.

Network Analysis

Methods that construct, refine, and identify relevant structures from graph-representations of military situations. Networks of interest include infrastructure (e.g. electrical grids, transportation networks), command and control, influence, communication and social behaviors, decision sequences, and workflow. Extracted information includes isolating critical nodes, estimating intent, assessing stability, and predicting network capacity or throughput.

Game Theory

Methods that explicitly deal with adversarial reasoning of a complex adaptive threat in battle management and mission planning systems.

Social Modeling

Approaches that can effectively represent the complex interrelationships of the cultural environments in which military forces may need to operate. Techniques that can rapidly adapt models to a dynamically changing situation are of particular interest.

Planning and Control

Procedures that provide adaptive platform and system commands, select courses of action in military C4, and can operate with only low levels of operator direction in complex environments. This includes hybrid methods that can select low-level control laws based

on dynamic platform/system/ environment context while still providing necessary design margins for proper system operation.

Collective Autonomy

Algorithms and design approaches that employ a collection of sensor and weapon platforms, operating in concert to accomplish a task without central control mechanisms. The key objective is to derive specific platform control rules from specifications of behavior for the entire collection.

Dismount Automation

Methods to rapidly discover, create, and manage dynamic reporting and command mechanisms among distributed dismount soldiers, particularly processes that can operate in bandwidth - and power-limited environments, and exploit novel sensory modalities for communication at the squad level for operations when sight and sound are impaired.

Integrated Platforms

Air, ground and maritime vehicles and packages to achieve advantageous ISR sensing geometries and, if necessary, provide timely engagement. IXO is interested in novel platform concepts that can support persistent and pervasive ISR of the modern battlespace (urban, maritime and distributed) at affordable acquisition and operational costs.

Observables Management

Active and passive techniques to modify platform signatures at operational ranges, including concepts and components than can both control and predict projected signatures in the all spectral domains.

Very Large Databases

Technologies that can efficiently index and retrieve information from heterogeneous, disjointed, and distributed databases, focused on IXO mission areas such as automatic generation of metadata/indices from signal data, spatiotemporal queries, and information fusion.

Human-computer Interaction

Techniques to improve warfighters interaction experience with information exploitation systems. Methods are desired that determine the users' information needs, intelligently de-clutter displays, respond to speech and gesture input, and manipulate data into desired formats.

SYSTEM APPLICATIONS OF INTEREST

IXO is interested in applications that can significantly contribute to the prosecution of enemies anywhere on the surface of the planet. While IXO is interested in integrated system applications, we are also interested in high payoff subsystems that, when placed in the appropriate system context, can be shown to significantly improve performance. High payoff system applications that interest IXO include but are not limited to:

Rapidly Defeating Elusive Surface Targets

Future battlefields will continue to be populated with targets that use mobility as a key survival tactic. Future high-value targets will range from quiet submarines, to mobile missile/artillery, to specific individual insurgents. Systems are desired that can combine effective solutions for pervasive and persistent surveillance of the battlespace, exploitation of sensor returns, agile and responsive C4, and linkages to kill methods for high-value targets.

Understanding of the 21st Century Battlespace

US forces need to dominate the 21st Century battlespace including Rural, Urban and Maritime environments. The key to effective operations is the in-depth understanding of the state and interrelationships of the population, forces and infrastructure at multiple levels of abstraction. Systems are desired that can supply new observables, integrate and fuse current inputs, update urban/littoral models, and project civilay versus combatant activity. Approaches that can successfully and effectively present the tactical situation to warfighters are desired. Systems are desired that can rapidly create and maintain the battlespace models, fuse multiple sources of intelligence, predict behavior of battlespace groups/nations/regions/networks, perform context adaptive C4, and effectively present the situation to commanders.

Managing the Scale and Complexity of the Network-centric Battlespace

US forces will be increasingly networked across service, location, domain (land sea and air), echelon, and platform. This trend increases responsiveness, flexibility and combat effectiveness, but also increases the inherent complexity of battle/platform management. Systems are desired that can derive low-level commands from high-level system goals (for manned and unmanned systems), produce meaningful summaries of complex dynamic situations, and scale to thousands of independently operating entities.

Combat ID of Individuals

While following their rules of engagement, warfighters must make rapid decisions to engage specific individuals based on limited observables interpreted in the context of the evolving situation. IXO is interested in systems that can augment the observables within constrained timelines and present actionable results to the warfighter. Systems that can discriminate individuals who are carrying weapons, show hostile intent/pose, or exhibit hostile behavior and other discriminating characteristics are desired.

Getting Actionable Combat Information to the Busy Warfighter

On modern battlefields (and also traditional battlefields) low echelon fighters must concentrate on observing their immediate environment. They cannot go “heads down” in situation displays. Conversely, higher-echelon fighters are “zoomed out” from the immediate action in order to obtain a sense of the larger battlespace picture. As a result they are susceptible to being swamped by too much detail. IXO is interested in system approaches that can exploit context and model information display/presentation techniques to overcome these limitations.

Obtaining Reliable Forensics in Cluttered Environments

In counter-insurgency operations, targets of interest are often not known until a significant event (e.g. detonation of IED) occurs. In those instances, reliably and quickly determining the origin of the devices/vehicles becomes the key to preventing subsequent attacks. IXO is interested in systems that collect wide area observables in the absence of any strong *a priori* cues, analyze the prior time history of events and track insurgent activities to their point of origin.

Extending the Effective Line of Sight

Warfighters can directly observe threats with which they are in contact while their intelligence systems describe what is generally far away. However, warfighters are often unaware of threats in their immediate proximity but not within their lines of sight. Deploying small scout sensors on air and ground platforms are only a part of the solution. IXO is interested in system approaches that integrate/fuse results from many diverse sources/sensors and effectively expand the views of the immediate battlespace. Approaches that can sense through/around obstacles, alter viewpoints of remote sensors and extract relevant situation information from sensor feeds are desired.

BAA07-42 IPTO Office-wide BAA

DARPA-ITPO

Due by July 2, 2008

IPTO is pursuing a broad Cognitive Systems research agenda that addresses several of these complexity areas. The first area is the development of advanced information processing techniques for increasing warfighter productivity. The second area is applying cognitive systems techniques, focusing on learning, to address software and system requirements associated with the rapidly changing scenarios encountered in military operations. Increasing situational awareness at all levels of command is critical to successful global operations. IPTO supports research in Language Processing with the goal of producing automatic and accurate language translation and distillation. Microelectronics trends continue to offer improvements in "raw computing power." IPTO seeks to develop High Productivity Systems and Software solutions that influence and exploit these improvements and substantially increase the productivity resulting from these trends to support national security applications. DARPA's leadership in the development of modern computing, communications, and information technology is well-known and includes such advances as time-sharing/interactive computing, the ARPANET/internet, advanced microprocessor architectures, natural language processing and search technology.

BAA07-07 WNaN Adaptive Network Development (WAND)
Agency: DARPA-STO

Type: Presolicitation Notice

Due Date: Submissions must be received by **Feb. 22, 2008** per Mod. 3 Full proposals for first selections: May 24, 2007

Website: http://www.darpa.mil/baa/baa07-07.html

Wireless Network after Next (WNaN) Adaptive Network Development (WAND). The goal of the WAND effort is to design and develop the network technologies necessary to establish ultra-large (tens of thousands of nodes), highly-scalable, highly-adaptive ad-hoc networks that provide robust networking across densely-connected deployments of inexpensive wireless nodes. The WNaN premise is that WAND-enabled networks will adapt to changing conditions and mission requirements by adjusting the topology of the network and the operational mode of the wireless nodes, particularly at the physical and link layers, to create and maintain a rich, multiply-connected network fabric. This rich interconnection fabric will provide superior battlefield communications at lower system cost and enhance survivability by ensuring information, applications, and services are readily available within the tactical environment.

The development of wireless nodes to support WAND is ongoing under the Wireless Adaptive Network Node (WANN) BAA (BAA06-26). Contracts have been awarded under this BAA to develop and produce low-cost, highly adaptive wireless nodes, which will be delivered to WAND developers for network technology development, integration, test and demonstration. The WANN wireless node developers will develop and publish non-proprietary network Application Program Interfaces (APIs) for design and integration of network technologies / processes within the node. The APIs, which will be published in the 2nd QTR FY07, are the means by which the WNaN network will be able to control and manage the adaptive features of the wireless nodes. Feedback on the draft APIs will be solicited from outside sources, including WAND proposers.
The WAND program will be conducted as 3 sequential phases to design, develop, integrate, and demonstrate network technologies that support the WNaN network vision. The developed network technologies will support network scalability and network formation from two to tens of thousands of WNaN operational nodes.